



02356.0086 SEQUENCE LISTING  
SEQUENCE LISTING

<110> Institut Pasteur

<120> PLASMODIUM FALCIPARUM ANTIGENS AND VACCINE AND DIAGNOSTIC USES THEREOF

<130> 000466-0035

<150> CA 2,345,206

<151> 2001-05-16

<150> CA 2,346,968

<151> 2001-05-23

<160> 18

<170> PatentIn version 3.1

<210> 1

<211> 192

<212> DNA

<213> Plasmodium falciparum

<400> 1  
gaattccata tgcacgatta catatatgtat gatcgatctt acaataatga taaagagaaaa 60  
aatgttataa aaagtgtataa taaaaatgtt ataaaaaagtg ataataaaaa tgattataaa 120  
aagtgtataa aaaatgttat aaaaagtgtat aataaaaaatg ttataaaaaag tgataataaa 180  
aatgtggaat tc 192

<210> 2

<211> 351

<212> DNA

<213> Plasmodium falciparum

02356.0086 SEQUENCE LISTING

<400> 2  
gaattcccgatcctcgaaataatgaccaa gaagatgcta ctgacgatgt tgtagaaaat 60  
agtagagatgataataatag tctcttaat agcgtagata atcaaagtaa tgttttaat 120  
agagaagatc ctattgcttc tgaaactgaa gttgttaagt aacctgagga ttcaagtagg 180  
ataatgacta cagaagttcc aagtactact gtaaaacccc ctgatgaaaa acgatctgaa 240  
gaagtagggag aaaaagaagc taaagaaatt aaagtagaaac ctgttgtacc aagagccatt 300  
ggagaaccaa tggaaaattc tgtgagcgta cagtccttc ctaaggaatt c 351

<210> 3

<211> 64

<212> PRT

<213> Plasmodium falciparum

<400> 3

Glu Phe His Met His Asp Tyr Ile Tyr Asp Asp Arg Ile Tyr Asn Asn  
1 5 10 15

Asp Lys Glu Lys Asn Val Ile Lys Ser Asp Asn Lys Asn Val Ile Lys  
20 25 30

Ser Asp Asn Lys Asn Asp Tyr Lys Lys Cys Asn Lys Asn Val Ile Lys  
35 40 45

Ser Asp Asn Lys Asn Val Ile Lys Ser Asp Asn Lys Asn Val Glu Phe  
50 55 60

<210> 4

<211> 117

<212> PRT

<213> Plasmodium falciparum

<400> 4

Glu Phe Pro Asp Pro Arg Ser Asn Asp Gln Glu Asp Ala Thr Asp Asp  
1 5 10 15

Val Val Glu Asn Ser Arg Asp Asp Asn Asn Ser Leu Ser Asn Ser Val  
20 25 30

02356.0086 SEQUENCE LISTING

Asp Asn Gln Ser Asn Val Leu Asn Arg Glu Asp Pro Ile Ala Ser Glu  
35 40 45

Thr Glu Val Val Ser Glu Pro Glu Asp Ser Ser Arg Ile Met Thr Thr  
50 55 60

Glu Val Pro Ser Thr Thr Val Lys Pro Pro Asp Glu Lys Arg Ser Glu  
65 70 75 80

Glu Val Gly Glu Lys Glu Ala Lys Glu Ile Lys Val Glu Pro Val Val  
85 90 95

Pro Arg Ala Ile Gly Glu Pro Met Glu Asn Ser Val Ser Val Gln Ser  
100 105 110

Pro Pro Lys Glu Phe  
115

<210> 5

<211> 5

<212> PRT

<213> Plasmodium falciparum

<400> 5

Asp Asn Lys Asn Val  
1 5

<210> 6

<211> 5

<212> PRT

<213> Plasmodium falciparum

<400> 6

Asp Asn Lys Asn Asp  
1 5

<210> 7

<211> 6

<212> PRT

## 02356.0086 SEQUENCE LISTING

&lt;213&gt; Plasmodium falciparum

&lt;400&gt; 7

Asp Lys Glu Lys Asn Val  
1 5

&lt;210&gt; 8

&lt;211&gt; 7

&lt;212&gt; PRT

&lt;213&gt; Plasmodium falciparum

&lt;400&gt; 8

Lys Ser Asp Asn Lys Asn Val  
1 5

&lt;210&gt; 9

&lt;211&gt; 1524

&lt;212&gt; DNA

&lt;213&gt; Plasmodium falciparum

&lt;220&gt;

&lt;221&gt; CDS

&lt;222&gt; (1)..(1524)

&lt;223&gt;

&lt;400&gt; 9

atg aag acg aca aaa gaa aat gac aat aat aac ata gta cat tat gta  
Met Lys Thr Thr Lys Glu Asn Asp Asn Asn Asn Ile Val His Tyr Val  
1 5 10 15

48

gat tgg ata aac cag att ttt aaa aag aat tct tta caa tgt gat tta  
Asp Trp Ile Asn Gln Ile Phe Lys Lys Asn Ser Leu Gln Cys Asp Leu  
20 25 30

96

tat ttt ttg gat gac aac aaa gaa aaa gat gtt agt aag aaa aga aaa  
Tyr Phe Leu Asp Asp Asn Lys Glu Lys Asp Val Ser Lys Lys Arg Lys  
35 40 45

144

gct caa ttg aag gat gaa tat gat aat ata tca agg agc aaa gaa aat  
Ala Gln Leu Lys Asp Glu Tyr Asp Asn Ile Ser Arg Ser Lys Glu Asn  
50 55 60

192

## 02356.0086 SEQUENCE LISTING

att aat aat tcc aaa aaa ata aaa aat gaa tta agt ata aaa gat aat Ile Asn Asn Ser Lys Lys Ile Lys Asn Glu Leu Ser Ile Lys Asp Asn 65 70 75 80	240
atg cac gat tac ata tat gat gat cgt atc tac aat aat gat aaa gag Met His Asp Tyr Ile Tyr Asp Asp Arg Ile Tyr Asn Asn Asp Lys Glu 85 90 95	288
aaa aat gtt ata aaa agt gat aat aaa aat gtt ata aaa agt gat aat Lys Asn Val Ile Lys Ser Asp Asn Lys Asn Val Ile Lys Ser Asp Asn 100 105 110	336
aaa aat gat tat aaa aag tgt aat aaa aat gtt ata aaa agt gat aat Lys Asn Asp Tyr Lys Cys Asn Lys Asn Val Ile Lys Ser Asp Asn 115 120 125	384
aaa aat gtt ata aaa agt gat aat aaa aat gtt ata aaa agt gat aat Lys Asn Val Ile Lys Ser Asp Asn Lys Asn Val Ile Lys Ser Asp Asn 130 135 140	432
aaa aat gtt ata aaa agt gat tat aaa agt gat gat aga aat gct tgt Lys Asn Val Ile Lys Ser Asp Tyr Lys Ser Asp Asp Arg Asn Ala Cys 145 150 155 160	480
gat att tat aaa agt aat aaa aat gtt cct gat aat tgc cat ata Asp Ile Tyr Lys Ser Asn Lys Asn Val Pro Asp Asn Cys His Ile 165 170 175	528
tat gat gat aat agt tca gtt gaa aat tta gat gga aaa aat aaa tta Tyr Asp Asp Asn Ser Ser Val Glu Asn Leu Asp Gly Lys Asn Lys Leu 180 185 190	576
aat aat ata agg aac ata cat aat gat aac tca tct tca tgc gat ata Asn Asn Ile Arg Asn Ile His Asn Asp Asn Ser Ser Cys Asp Ile 195 200 205	624
tcc gat ata aaa agt gaa gat gaa tat ata gaa cca tat gaa aaa aag Ser Asp Ile Lys Ser Glu Asp Glu Tyr Ile Glu Pro Tyr Glu Lys Lys 210 215 220	672
aat gaa gaa aat ata aat gaa tat aag aat aag aaa aat ata gcc aat Asn Glu Glu Asn Ile Asn Glu Tyr Lys Asn Lys Lys Asn Ile Ala Asn 225 230 235 240	720
gaa aat ata aaa gaa gga aag agt tca att tat aat gat gaa cat aat Glu Asn Ile Lys Glu Gly Lys Ser Ser Ile Tyr Asn Asp Glu His Asn 245 250 255	768
tat aat tca tta tta tat aat tct tgt aat ggt gaa ata agt aag atc Tyr Asn Ser Leu Leu Tyr Asn Ser Cys Asn Gly Glu Ile Ser Lys Ile 260 265 270	816
aac aaa ata agt agt cat aat aat att gat aat aat atg gat aat tat Asn Lys Ile Ser Ser His Asn Asn Ile Asp Asn Asn Met Asp Asn Tyr 275 280 285	864
aat acg ttt gca aat gtg aat aat ttt ata ata tat tcc tca gat gat Asn Thr Phe Ala Asn Val Asn Asn Phe Ile Ile Tyr Ser Ser Asp Asp 290 295 300	912
gaa gat aat ata tca aat tat tat aat ggt aaa gac gta tta aat gat Glu Asp Asn Ile Ser Asn Tyr Tyr Asn Gly Lys Asp Val Leu Asn Asp	960

02356.0086 SEQUENCE LISTING

305	310	315	320
gag att atg ttc cct ata aaa ttt aat ttt gaa aaa tta aaa aaa aat Glu Ile Met Phe Pro Ile Lys Phe Asn Phe Glu Lys Leu Lys Lys Asn 325 330 335 1008			
att tat gta ata gag cat ata gac aaa ata tat tat gat aca ttt tta Ile Tyr Val Ile Glu His Ile Asp Lys Ile Tyr Tyr Asp Thr Phe Leu 340 345 350 1056			
aat aaa aat cca agt gaa aaa agt gtt ttt atg aat gat gaa tct act Asn Lys Asn Pro Ser Glu Lys Ser Val Phe Met Asn Asp Glu Ser Thr 355 360 365 1104			
ggg tat ttg aaa aat gat gtg aat gac aaa tgt gtt gtt gat aat ata Gly Tyr Leu Lys Asn Asp Val Asn Asp Lys Cys Val Val Asp Asn Ile 370 375 380 1152			
aat gtt att aat cct tct agt gtg aat acg ttg agt aat att tca aat Asn Val Ile Asn Pro Ser Ser Val Asn Thr Leu Ser Asn Ile Ser Asn 385 390 395 400 1200			
att agg aat gaa aaa ata gaa aat aat aat aag aat gaa aaa tta ata Ile Arg Asn Glu Lys Ile Glu Asn Asn Asn Lys Asn Glu Lys Leu Ile 405 410 415 1248			
aaa tca tat cct aca caa tca aaa aat gtt atg agt aca ttt tcc ttt Lys Ser Tyr Pro Thr Gln Ser Lys Asn Val Met Ser Thr Phe Ser Phe 420 425 430 1296			
tgg aat att gaa aag gag aca ttt ata aca aaa cct ttg tat gca caa Trp Asn Ile Glu Lys Glu Thr Phe Ile Thr Lys Pro Leu Tyr Ala Gln 435 440 445 1344			
aat ttg aga aaa aaa caa ttt agt tta tta gat gaa tct gaa gag atg Asn Leu Arg Lys Lys Gln Phe Ser Leu Leu Asp Glu Ser Glu Glu Met 450 455 460 1392			
ata aga aat tat tca tct aat caa tat tct ata aaa ttt gta cca aga Ile Arg Asn Tyr Ser Ser Asn Gln Tyr Ser Ile Lys Phe Val Pro Arg 465 470 475 480 1440			
cat tta tta tat gta atg agt caa gtt gct tct cga tcc ttt ttt gat His Leu Leu Tyr Val Met Ser Gln Val Ala Ser Arg Ser Phe Phe Asp 485 490 495 1488			
cct tta tat aga aag cag tta ttt ttt cgt tac taa Pro Leu Tyr Arg Lys Gln Leu Phe Phe Arg Tyr 500 505 1524			

<210> 10

<211> 507

<212> PRT

<213> Plasmodium falciparum

<400> 10

## 02356.0086 SEQUENCE LISTING

Met Lys Thr Thr Lys Glu Asn Asp Asn Asn Asn Ile Val His Tyr Val  
1 5 10 15

Asp Trp Ile Asn Gln Ile Phe Lys Lys Asn Ser Leu Gln Cys Asp Leu  
20 25 30

Tyr Phe Leu Asp Asp Asn Lys Glu Lys Asp Val Ser Lys Lys Arg Lys  
35 40 45

Ala Gln Leu Lys Asp Glu Tyr Asp Asn Ile Ser Arg Ser Lys Glu Asn  
50 55 60

Ile Asn Asn Ser Lys Lys Ile Lys Asn Glu Leu Ser Ile Lys Asp Asn  
65 70 75 80

Met His Asp Tyr Ile Tyr Asp Asp Arg Ile Tyr Asn Asn Asp Lys Glu  
85 90 95

Lys Asn Val Ile Lys Ser Asp Asn Lys Asn Val Ile Lys Ser Asp Asn  
100 105 110

Lys Asn Asp Tyr Lys Lys Cys Asn Lys Asn Val Ile Lys Ser Asp Asn  
115 120 125

Lys Asn Val Ile Lys Ser Asp Asn Lys Asn Val Ile Lys Ser Asp Asn  
130 135 140

Lys Asn Val Ile Lys Ser Asp Tyr Lys Ser Asp Asp Arg Asn Ala Cys  
145 150 155 160

Asp Ile Tyr Lys Ser Asn Lys Lys Asn Val Pro Asp Asn Cys His Ile  
165 170 175

Tyr Asp Asp Asn Ser Ser Val Glu Asn Leu Asp Gly Lys Asn Lys Leu  
180 185 190

Asn Asn Ile Arg Asn Ile His Asn Asp Asn Ser Ser Ser Cys Asp Ile  
195 200 205

Ser Asp Ile Lys Ser Glu Asp Glu Tyr Ile Glu Pro Tyr Glu Lys Lys  
210 215 220

Asn Glu Glu Asn Ile Asn Glu Tyr Lys Asn Lys Lys Asn Ile Ala Asn  
225 230 235 240

Glu Asn Ile Lys Glu Gly Lys Ser Ser Ile Tyr Asn Asp Glu His Asn  
245 250 255

## 02356.0086 SEQUENCE LISTING

Tyr Asn Ser Leu Leu Tyr Asn Ser Cys Asn Gly Glu Ile Ser Lys Ile  
260 265 270

Asn Lys Ile Ser Ser His Asn Asn Ile Asp Asn Asn Met Asp Asn Tyr  
275 280 285

Asn Thr Phe Ala Asn Val Asn Asn Phe Ile Ile Tyr Ser Ser Asp Asp  
290 295 300

Glu Asp Asn Ile Ser Asn Tyr Tyr Asn Gly Lys Asp Val Leu Asn Asp  
305 310 315 320

Glu Ile Met Phe Pro Ile Lys Phe Asn Phe Glu Lys Leu Lys Lys Asn  
325 330 335

Ile Tyr Val Ile Glu His Ile Asp Lys Ile Tyr Tyr Asp Thr Phe Leu  
340 345 350

Asn Lys Asn Pro Ser Glu Lys Ser Val Phe Met Asn Asp Glu Ser Thr  
355 360 365

Gly Tyr Leu Lys Asn Asp Val Asn Asp Lys Cys Val Val Asp Asn Ile  
370 375 380

Asn Val Ile Asn Pro Ser Ser Val Asn Thr Leu Ser Asn Ile Ser Asn  
385 390 395 400

Ile Arg Asn Glu Lys Ile Glu Asn Asn Asn Lys Asn Glu Lys Leu Ile  
405 410 415

Lys Ser Tyr Pro Thr Gln Ser Lys Asn Val Met Ser Thr Phe Ser Phe  
420 425 430

Trp Asn Ile Glu Lys Glu Thr Phe Ile Thr Lys Pro Leu Tyr Ala Gln  
435 440 445

Asn Leu Arg Lys Lys Gln Phe Ser Leu Leu Asp Glu Ser Glu Glu Met  
450 455 460

Ile Arg Asn Tyr Ser Ser Asn Gln Tyr Ser Ile Lys Phe Val Pro Arg  
465 470 475 480

His Leu Leu Tyr Val Met Ser Gln Val Ala Ser Arg Ser Phe Phe Asp  
485 490 495

Pro Leu Tyr Arg Lys Gln Leu Phe Phe Arg Tyr  
500 505

02356.0086 SEQUENCE LISTING

<210> 11  
<211> 5050  
<212> DNA  
<213> **Plasmodium falciparum**

<220>  
<221> CDS  
<222> (1)..(4464)  
<223>

<220>  
<221> CDS  
<222> (4557)..(4634)  
<223>

<220>  
<221> CDS  
<222> (4751)..(4837)  
<223>

<220>  
<221> CDS  
<222> (4973)..(5047)  
<223>

<400> 11 atg aaa ggg aaa atg aat atg tgt ttg ttt ttt ttc tat tct ata tta 48  
Met Lys Gly Lys Met Asn Met Cys Leu Phe Phe Phe Tyr Ser Ile Leu  
1 5 10 15  
tat gtt gta tta tgt acc tat gta tta ggt ata agt gaa gag tat ttg 96  
Tyr Val Val Leu Cys Thr Tyr Val Leu Gly Ile Ser Glu Glu Tyr Leu  
20 25 30  
aag gaa agg ccc caa ggt tta aat gtt gag act aat aat aat aat aat 144  
Lys Glu Arg Pro Gln Gly Leu Asn Val Glu Thr Asn Asn Asn Asn Asn  
Page 9

## 02356.0086 SEQUENCE LISTING

35

40

45

aat aat aat aat aat aat agt aat agt aac gat gcg atg tct ttt gta Asn Asn Asn Asn Asn Asn Ser Asn Ser Asn Asp Ala Met Ser Phe Val	192
50 55 60	
aat gaa gta ata agg ttt ata gaa aac gag aag gat gat aaa gaa gat Asn Glu Val Ile Arg Phe Ile Glu Asn Glu Lys Asp Asp Lys Glu Asp	240
65 70 75 80	
aaa aaa gtg aag ata ata tct aga cct gtt gag aat aca tta cat aga Lys Lys Val Lys Ile Ile Ser Arg Pro Val Glu Asn Thr Leu His Arg	288
85 90 95	
tat cca gtt agt tct ttt ctg aat atc aaa aag tat ggt agg aaa ggg Tyr Pro Val Ser Ser Phe Leu Asn Ile Lys Lys Tyr Gly Arg Lys Gly	336
100 105 110	
gaa tat ttg aat aga aat agt ttt gtt caa aga tca tat ata agg ggt Glu Tyr Leu Asn Arg Asn Ser Phe Val Gln Arg Ser Tyr Ile Arg Gly	384
115 120 125	
tgt aaa gga aaa aga agc aca cat aca tgg ata tgt gaa aat aaa ggg Cys Lys Gly Lys Arg Ser Thr His Thr Trp Ile Cys Glu Asn Lys Gly	432
130 135 140	
aat aat aat ata tgt att cct gat aga cgt gta caa tta tgt ata aca Asn Asn Asn Ile Cys Ile Pro Asp Arg Arg Val Gln Leu Cys Ile Thr	480
145 150 155 160	
gct ctt caa gat tta aaa aat tca gga tct gaa acg act gat aga aaa Ala Leu Gln Asp Leu Lys Asn Ser Gly Ser Glu Thr Thr Asp Arg Lys	528
165 170 175	
tta tta aga gat aaa gta ttt gat tca gct atg tat gaa act gat ttg Leu Leu Arg Asp Lys Val Phe Asp Ser Ala Met Tyr Glu Thr Asp Leu	576
180 185 190	
tta tgg aat aaa tat ggt ttt cgt gga ttt gat gat ttt tgt gac gat Leu Trp Asn Lys Tyr Gly Phe Arg Gly Phe Asp Asp Phe Cys Asp Asp	624
195 200 205	
gta aaa aat agt tat tta gat tat aaa gat gtt ata ttt gga acc gat Val Lys Asn Ser Tyr Leu Asp Tyr Lys Asp Val Ile Phe Gly Thr Asp	672
210 215 220	
tta gat aaa aat aat ata tca aag tta gta gag gaa tca tta aaa cgt Leu Asp Lys Asn Asn Ile Ser Lys Leu Val Glu Glu Ser Leu Lys Arg	720
225 230 235 240	
ttt ttt aaa aaa gat agt agt gta ctt aat cct act gct tgg tgg aga Phe Phe Lys Lys Asp Ser Ser Val Leu Asn Pro Thr Ala Trp Trp Arg	768
245 250 255	
agg tat gga aca aga cta tgg aaa act atg ata cag cca tat gct cat Arg Tyr Gly Thr Arg Leu Trp Lys Thr Met Ile Gln Pro Tyr Ala His	816
260 265 270	
tta gga tgt aga aaa cct gat gag aat gaa cct cag ata aat aga tgg Leu Gly Cys Arg Lys Pro Asp Glu Asn Glu Pro Gln Ile Asn Arg Trp	864
275 280 285	
att ctg gaa tgg ggg aaa tat aat tgt aga tta atg aag gag aaa gaa	912

**02356.0086 SEQUENCE LISTING**

Ile	Leu	Glu	Trp	Gly	Lys	Tyr	Asn	Cys	Arg	Leu	Met	Lys	Glu	Lys	Glu		
290					295						300						
aaa	tta	tta	aca	gga	gaa	tgt	tct	gtt	aat	aga	aaa	aaa	tct	gac	tgc	960	
Lys	Leu	Leu	Thr	Gly	Glu	Cys	Ser	Val	Asn	Arg	Lys	Lys	Ser	Asp	Cys		
305					310					315					320		
tca	acc	gga	tgt	aat	aat	gag	tgt	tat	acc	tat	agg	agt	ctt	att	aat	1008	
Ser	Thr	Gly	Cys	Asn	Asn	Glu	Cys	Tyr	Thr	Tyr	Arg	Ser	Leu	Ile	Asn		
					325				330					335			
aga	caa	aga	tat	gag	gtc	tct	ata	tta	gga	aaa	aaa	tat	att	aaa	gta	1056	
Arg	Gln	Arg	Tyr	Glu	Val	Ser	Ile	Leu	Gly	Lys	Lys	Tyr	Ile	Lys	Val		
					340				345					350			
gta	cga	tat	act	ata	ttt	agg	aga	aaa	ata	gtt	caa	cct	gat	aat	gct	1104	
Val	Arg	Tyr	Thr	Ile	Phe	Arg	Arg	Lys	Ile	Val	Gln	Pro	Asp	Asn	Ala		
						355				360			365				
ttg	gat	ttt	tta	aaa	tta	aat	tgt	tct	gag	tgt	aag	gat	att	gat	ttt	1152	
Leu	Asp	Phe	Leu	Lys	Leu	Asn	Cys	Ser	Glu	Cys	Lys	Asp	Ile	Asp	Phe		
						370		375			380						
aaa	ccc	ttt	ttt	gaa	ttt	gaa	tat	ggt	aaa	tat	gaa	gaa	aaa	tgt	atg	1200	
Lys	Pro	Phe	Phe	Glu	Phe	Glu	Tyr	Gly	Lys	Tyr	Glu	Glu	Lys	Cys	Met		
						385				395					400		
tgt	caa	tca	tat	att	gat	tta	aaa	atc	caa	ttt	aaa	aat	aat	aat	gat	att	1248
Cys	Gln	Ser	Tyr	Ile	Asp	Leu	Lys	Ile	Gln	Phe	Lys	Asn	Asn	Asp	Ile		
							405		410					415			
tgt	tca	ttt	aat	gct	caa	aca	gat	act	gtt	tct	agc	gat	aaa	aga	ttt	1296	
Cys	Ser	Phe	Asn	Ala	Gln	Thr	Asp	Thr	Val	Ser	Ser	Asp	Lys	Arg	Phe		
							420		425					430			
tgt	ctt	gaa	aag	aaa	gaa	ttt	aaa	cca	tgg	aaa	tgt	gat	aaa	aat	tct	1344	
Cys	Leu	Glu	Lys	Lys	Glu	Phe	Lys	Pro	Trp	Lys	Cys	Asp	Lys	Asn	Ser		
							435		440				445				
ttt	gaa	aca	gtt	cat	cat	aaa	ggt	gta	tgt	gtg	tca	ccg	aga	aga	caa	1392	
Phe	Glu	Thr	Val	His	His	Lys	Gly	Val	Cys	Val	Ser	Pro	Arg	Arg	Gln		
						450		455			460						
ggt	ttt	tgt	tta	gga	aat	ttg	aac	tat	cta	ctg	aat	gat	gat	att	tat	1440	
Gly	Phe	Cys	Leu	Gly	Asn	Leu	Asn	Tyr	Leu	Leu	Asn	Asp	Asp	Ile	Tyr		
							465		470					480			
aat	gta	cat	aat	tca	caa	cta	ctt	atc	gaa	att	ata	atg	gct	tct	aaa	1488	
Asn	Val	His	Asn	Ser	Gln	Leu	Leu	Ile	Glu	Ile	Ile	Met	Ala	Ser	Lys		
							485		490					495			
caa	gaa	gga	aag	tta	tta	tgg	aaa	aaa	cat	gga	aca	ata	ctt	gat	aac	1536	
Gln	Glu	Gly	Lys	Leu	Leu	Trp	Lys	Lys	His	Gly	Thr	Ile	Leu	Asp	Asn		
							500		505					510			
cag	aat	gca	tgc	aaa	tat	ata	aat	gat	agt	tat	gtt	gat	tat	aaa	gat	1584	
Gln	Asn	Ala	Cys	Lys	Tyr	Ile	Asn	Asp	Ser	Tyr	Val	Asp	Tyr	Lys	Asp		
							515		520					525			
ata	gtt	att	gga	aat	gat	tta	tgg	aat	gat	aac	aac	tct	ata	aaa	gtt	1632	
Ile	Val	Ile	Gly	Asn	Asp	Leu	Trp	Asn	Asp	Asn	Asn	Ser	Ile	Lys	Val		
							530		535					540			

## 02356.0086 SEQUENCE LISTING

caa aat aat tta aat tta att ttt gaa aga aat ttt ggt tat aaa gtt Gln Asn Asn Leu Asn Leu Ile Phe Glu Arg Asn Phe Gly Tyr Lys Val 545 550 555 560	1680
gga aga aat aaa ctc ttt aaa aca att aaa gaa tta aaa aat gta tgg Gly Arg Asn Lys Leu Phe Lys Thr Ile Lys Glu Leu Lys Asn Val Trp 565 570 575	1728
tgg ata tta aat aga aat aaa gta tgg gaa tca atg aga tgt gga att Trp Ile Leu Asn Arg Asn Lys Val Trp Glu Ser Met Arg Cys Gly Ile 580 585 590	1776
gac gaa gta gat caa cgt aga aaa act tgt gaa aga ata gat gaa cta Asp Glu Val Asp Gln Arg Arg Lys Thr Cys Glu Arg Ile Asp Glu Leu 595 600 605	1824
gaa aac atg cca caa ttc ttt aga tgg ttt tca caa tgg gca cat ttc Glu Asn Met Pro Gln Phe Phe Arg Trp Phe Ser Gln Trp Ala His Phe 610 615 620	1872
ttt tgt aag gaa aaa gaa tat tgg gaa tta aaa tta aat gat aaa tgt Phe Cys Lys Glu Lys Glu Tyr Trp Glu Leu Lys Leu Asn Asp Lys Cys 625 630 635 640	1920
aca ggt aat aat gga aaa tcc tta tgt cag gat aaa aca tgt caa aat Thr Gly Asn Asn Gly Lys Ser Leu Cys Gln Asp Lys Thr Cys Gln Asn 645 650 655	1968
gtg tgt act aat atg aat tat tgg aca tat act aga aaa tta gct tat Val Cys Thr Asn Met Asn Tyr Trp Thr Tyr Thr Arg Lys Leu Ala Tyr 660 665 670	2016
gaa ata caa tcc gta aaa tat gat aaa gat aga aaa tta ttt agt ctt Glu Ile Gln Ser Val Lys Tyr Asp Lys Asp Arg Lys Leu Phe Ser Leu 675 680 685	2064
gct aaa gac aaa aat gta act aca ttt tta aag gaa aat gca aaa aat Ala Lys Asp Lys Asn Val Thr Thr Phe Leu Lys Glu Asn Ala Lys Asn 690 695 700	2112
tgt tct aat ata gat ttt aca aaa ata ttc gat cag ctt gac aaa ctc Cys Ser Asn Ile Asp Phe Thr Lys Ile Phe Asp Gln Leu Asp Lys Leu 705 710 715 720	2160
ttt aag gaa aga tgt tca tgt atg gat aca caa gtt tta gaa gta aaa Phe Lys Glu Arg Cys Ser Cys Met Asp Thr Gln Val Leu Glu Val Lys 725 730 735	2208
aac aaa gaa atg tta tct ata gac tca aat agt gaa gat gcg aca gat Asn Lys Glu Met Leu Ser Ile Asp Ser Asn Ser Glu Asp Ala Thr Asp 740 745 750	2256
ata agt gag aaa aat gga gag gaa gaa tta tat gta aat cac aat tct Ile Ser Glu Lys Asn Gly Glu Glu Glu Leu Tyr Val Asn His Asn Ser 755 760 765	2304
gtg agt gtc gca agt ggt aat aaa gaa atc gaa aag agt aag gat gaa Val Ser Val Ala Ser Gly Asn Lys Glu Ile Glu Lys Ser Lys Asp Glu 770 775 780	2352
aag caa cct gaa aaa gaa gca aaa caa act aat gga act tta acc gta Lys Gln Pro Glu Lys Glu Ala Lys Gln Thr Asn Gly Thr Leu Thr Val 785 790 795 800	2400

## 02356.0086 SEQUENCE LISTING

cga act gac aaa gat tca gat aga aac aaa gga aaa gat aca gct act	2448
Arg Thr Asp Lys Asp Ser Asp Arg Asn Lys Gly Lys Asp Thr Ala Thr	
805 810 815	
gat aca aaa aat tca cct gaa aat tta aaa gta cag gaa cat gga aca	2496
Asp Thr Lys Asn Ser Pro Glu Asn Leu Lys Val Gln Glu His Gly Thr	
820 825 830	
aat gga gaa aca ata aaa gaa gaa cca cca aaa tta cct gaa tca tct	2544
Asn Gly Glu Thr Ile Lys Glu Glu Pro Pro Lys Leu Pro Glu Ser Ser	
835 840 845	
gaa aca tta caa tca caa gaa caa tta gaa gca gaa gca caa aaa caa	2592
Glu Thr Leu Gln Ser Gln Glu Gln Leu Glu Ala Glu Ala Gln Lys Gln	
850 855 860	
aaa caa gaa gaa gaa cca aaa aaa caa gaa gaa gaa cca aaa aaa	2640
Lys Gln Glu Glu Glu Pro Lys Lys Gln Glu Glu Glu Pro Lys Lys	
865 870 875 880	
aaa caa gaa gaa gaa caa aaa cga gaa caa gaa caa aaa caa gaa caa	2688
Lys Gln Glu Glu Glu Gln Lys Arg Glu Gln Glu Gln Lys Gln Glu Gln	
885 890 895	
gaa gaa gaa gaa caa aaa caa gaa gaa gaa caa caa ata caa gat caa	2736
Glu Glu Glu Glu Gln Lys Gln Glu Glu Gln Glu Gln Ile Gln Asp Gln	
900 905 910	
tca caa agt gga tta gat caa tcc tca aaa gta gga gta gcg agt gaa	2784
Ser Gln Ser Gly Leu Asp Gln Ser Ser Lys Val Gly Val Ala Ser Glu	
915 920 925	
caa aat gaa att tct tca gga caa gaa caa aac gta aaa agc tct tca	2832
Gln Asn Glu Ile Ser Ser Gly Gln Glu Gln Asn Val Lys Ser Ser Ser	
930 935 940	
cct gaa gta gtt cca caa gaa aca act agt gaa aat ggg tca tca caa	2880
Pro Glu Val Val Pro Gln Glu Thr Thr Ser Glu Asn Gly Ser Ser Gln	
945 950 955 960	
gac aca aaa ata tca agt act gaa cca aat gag aat tct gtt gta gat	2928
Asp Thr Lys Ile Ser Ser Thr Glu Pro Asn Glu Asn Ser Val Val Asp	
965 970 975	
aga gca aca gat agt atg aat tta gat cct gaa aag gtt cat aat gaa	2976
Arg Ala Thr Asp Ser Met Asn Leu Asp Pro Glu Lys Val His Asn Glu	
980 985 990	
aat atg agt gat cca aat aca aat act gaa cca gat gca tct tta aaa	3024
Asn Met Ser Asp Pro Asn Thr Asn Thr Glu Pro Asp Ala Ser Leu Lys	
995 1000 1005	
gat gat aag aag gaa gtt gat gat gcc aaa aaa gaa ctt caa tct	3069
Asp Asp Lys Lys Glu Val Asp Asp Ala Lys Lys Glu Leu Gln Ser	
1010 1015 1020	
act gta tca aga att gaa tct aat gaa cag gac gtt caa agt aca	3114
Thr Val Ser Arg Ile Glu Ser Asn Glu Gln Asp Val Gln Ser Thr	
1025 1030 1035	
cca ccc gaa gat act cct act gtt gaa gga aaa gta gga gat aaa	3159
Pro Pro Glu Asp Thr Pro Thr Val Glu Gly Lys Val Gly Asp Lys	

02356.0086 SEQUENCE LISTING  
 1040                  1045                  1050

gca	gaa	atg	tta	act	tct	ccg	cat	gcg	aca	gat	aat	tct	gag	tcg		3204
Ala	Glu	Met	Leu	Thr	Ser	Pro	His	Ala	Thr	Asp	Asn	Ser	Glu	Ser		
1055						1060					1065					
gaa	tca	ggt	tta	aat	cca	act	gat	gac	att	aaa	aca	act	gat	ggt		3249
Glu	Ser	Gly	Leu	Asn	Pro	Thr	Asp	Asp	Ile	Lys	Thr	Thr	Asp	Gly		
1070						1075					1080					
gtt	gtt	aaa	gaa	caa	gaa	ata	tta	ggg	gga	ggt	gaa	agt	gca	act		3294
Val	Val	Lys	Glu	Gln	Glu	Ile	Leu	Gly	Gly	Gly	Glu	Ser	Ala	Thr		
1085						1090					1095					
gaa	aca	tca	aaa	agt	aat	tta	gaa	aaa	cct	aag	gat	gtt	gaa	cct		3339
Glu	Thr	Ser	Lys	Ser	Asn	Leu	Glu	Lys	Pro	Lys	Asp	Val	Glu	Pro		
1100						1105					1110					
tct	cat	gaa	ata	tct	gaa	cct	gtt	ctt	tct	ggt	aca	act	ggt	aaa		3384
Ser	His	Glu	Ile	Ser	Glu	Pro	Val	Leu	Ser	Gly	Thr	Thr	Gly	Lys		
1115						1120					1125					
gaa	gaa	tca	gag	tta	tta	aaa	agt	aaa	tcg	ata	gag	acg	aag	ggg		3429
Glu	Glu	Ser	Glu	Leu	Leu	Lys	Ser	Lys	Ser	Ile	Glu	Thr	Lys	Gly		
1130						1135					1140					
gaa	aca	gat	cct	cga	agt	aat	gac	caa	gaa	gat	gct	act	gac	gat		3474
Glu	Thr	Asp	Pro	Arg	Ser	Asn	Asp	Gln	Glu	Asp	Ala	Thr	Asp	Asp		
1145						1150					1155					
gtt	gta	gaa	aat	agt	aga	gat	gat	aat	aat	agt	ctc	tct	aat	agc		3519
Val	Val	Glu	Asn	Ser	Arg	Asp	Asp	Asn	Asn	Ser	Leu	Ser	Asn	Ser		
1160						1165					1170					
gta	gat	aat	caa	agt	aat	gtt	tta	aat	aga	gaa	gat	cct	att	gct		3564
Val	Asp	Asn	Gln	Ser	Asn	Val	Leu	Asn	Arg	Glu	Asp	Pro	Ile	Ala		
1175						1180					1185					
tct	gaa	act	gaa	gtt	gta	agt	gaa	cct	gag	gat	tca	agt	agg	ata		3609
Ser	Glu	Thr	Glu	Val	Val	Ser	Glu	Pro	Glu	Asp	Ser	Ser	Arg	Ile		
1190						1195					1200					
atg	act	aca	gaa	gtt	cca	agt	act	act	gta	aaa	ccc	cct	gat	gaa		3654
Met	Thr	Thr	Glu	Val	Pro	Ser	Thr	Thr	Val	Lys	Pro	Pro	Asp	Glu		
1205						1210					1215					
aaa	cga	tct	gaa	gaa	gta	gga	gaa	aaa	gaa	gct	aaa	gaa	att	aaa		3699
Lys	Arg	Ser	Glu	Glu	Val	Gly	Glu	Lys	Glu	Ala	Lys	Glu	Ile	Lys		
1220						1225					1230					
gta	gaa	cct	gtt	gta	cca	aga	gcc	att	gga	gaa	cca	atg	gaa	aat		3744
Val	Glu	Pro	Val	Val	Pro	Arg	Ala	Ile	Gly	Glu	Pro	Met	Glu	Asn		
1235						1240					1245					
tct	gtg	agc	gta	cag	tcc	cct	cct	aat	gta	gaa	gat	gtt	gaa	aaa		3789
Ser	Val	Ser	Val	Gln	Ser	Pro	Pro	Asn	Val	Glu	Asp	Val	Glu	Lys		
1250						1255					1260					
gaa	aca	ttg	ata	tct	gag	aat	aat	gga	tta	cat	aat	gat	aca	cac		3834
Glu	Thr	Leu	Ile	Ser	Glu	Asn	Asn	Gly	Leu	His	Asn	Asp	Thr	His		
1265						1270					1275					
aga	gga	aat	atc	agt	gaa	aag	gat	tta	atc	gat	att	cat	ttg	tta		3879

02356.0086 SEQUENCE LISTING

Arg	Gly	Asn	Ile	Ser	Glu	Lys	Asp	Leu	Ile	Asp	Ile	His	Leu	Leu	
1280						1285						1290			
aga	aat	gaa	gcg	ggt	agt	aca	ata	tta	gat	gat	tct	aga	aga	aat	3924
Arg	Asn	Glu	Ala	Gly	Ser	Thr	Ile	Leu	Asp	Asp	Ser	Arg	Arg	Asn	
1295						1300					1305				
Gly	Glu	Met	Thr	Glu	Gly	Ser	Glu	Ser	Asp	Val	Gly	Glu	Leu	Gln	3969
1310						1315					1320				
gaa	cat	aat	ttt	agc	aca	caa	caa	aaa	gat	gaa	aaa	gat	ttt	gac	4014
Glu	His	Asn	Phe	Ser	Thr	Gln	Gln	Lys	Asp	Glu	Lys	Asp	Phe	Asp	
1325						1330					1335				
caa	att	gcg	agc	gat	aga	gaa	aaa	gaa	gaa	att	caa	aaa	tta	ctt	4059
Gln	Ile	Ala	Ser	Asp	Arg	Glu	Lys	Glu	Glu	Ile	Gln	Lys	Leu	Leu	
1340						1345					1350				
aat	ata	gga	cat	gaa	gag	gat	gaa	gat	gta	tta	aaa	atg	gat	aga	4104
Asn	Ile	Gly	His	Glu	Glu	Asp	Glu	Asp	Val	Leu	Lys	Met	Asp	Arg	
1355						1360					1365				
aca	gag	gat	agt	atg	agt	gat	gga	gtt	aat	agt	cat	ttg	tat	tat	4149
Thr	Glu	Asp	Ser	Met	Ser	Asp	Gly	Val	Asn	Ser	His	Leu	Tyr	Tyr	
1370						1375					1380				
aat	aat	cta	tca	agt	gaa	gaa	aaa	atg	gaa	caa	tat	aat	aat	aga	4194
Asn	Asn	Leu	Ser	Ser	Glu	Glu	Lys	Met	Glu	Gln	Tyr	Asn	Asn	Arg	
1385						1390					1395				
gat	gct	tct	aaa	gat	aga	gaa	gaa	ata	ttg	aat	agg	tca	aac	aca	4239
Asp	Ala	Ser	Lys	Asp	Arg	Glu	Glu	Ile	Leu	Asn	Arg	Ser	Asn	Thr	
1400						1405					1410				
aat	aca	tgt	tct	aat	gaa	cat	tca	tta	aaa	tat	tgt	caa	tat	atg	4284
Asn	Thr	Cys	Ser	Asn	Glu	His	Ser	Leu	Lys	Tyr	Cys	Gln	Tyr	Met	
1415						1420					1425				
gaa	aga	aat	aag	gat	tta	tta	gaa	aca	tgt	tct	gaa	gac	aaa	agg	4329
Glu	Arg	Asn	Lys	Asp	Leu	Leu	Glu	Thr	Cys	Ser	Glu	Asp	Lys	Arg	
1430						1435					1440				
tta	cat	tta	tgt	tgt	gaa	ata	tca	gat	tat	tgt	tta	aaa	ttt	ttc	4374
Leu	His	Leu	Cys	Cys	Glu	Ile	Ser	Asp	Tyr	Cys	Leu	Lys	Phe	Phe	
1445						1450					1455				
aat	cct	aaa	tcg	ata	gaa	tac	ttt	gat	tgt	aca	caa	aaa	gaa	ttt	4419
Asn	Pro	Lys	Ser	Ile	Glu	Tyr	Phe	Asp	Cys	Thr	Gln	Lys	Glu	Phe	
1460						1465					1470				
gat	gac	cct	aca	tat	aat	tgt	ttt	aga	aaa	caa	aga	ttt	aca	agt	4464
Asp	Asp	Pro	Thr	Tyr	Asn	Cys	Phe	Arg	Lys	Gln	Arg	Phe	Thr	Ser	
1475						1480					1485				
atgtcatgtt ataaaaattaa aaacaatata cattaatatg ttaataaaaa aaataatata															4524
tttttttctc tttttctttt tttttatag gt atg cat tat att gcc ggg ggt Met His Tyr Ile Ala Gly Gly															4577
1490															1495
ggt ata ata gcc ctt tta ttg ttt att tta ggt tca gcc agc tat Gly Ile Ile Ala Leu Leu Leu Phe Ile Leu Gly Ser Ala Ser Tyr															4622

02356.0086 SEQUENCE LISTING  
 1500                    1505                    1510

agg aag aat ttg taagaaaaaa aggatgaaga aatataaaca aaaatataaa	4674
Arg Lys Asn Leu	
tatatgcata tatatttaag tattataaga acatatatat aaataaatat gtatatttt	4734
attttattat tatagg gat gat gaa aaa gga ttc tac gat tct aat tta	4783
Asp Asp Glu Lys Gly Phe Tyr Asp Ser Asn Leu	
1515                    1520                    1525	
aat gat tct gct ttt gaa tat aat aat aat aaa tat aat aaa tta	4828
Asn Asp Ser Ala Phe Glu Tyr Asn Asn Asn Lys Tyr Asn Lys Leu	
1530                    1535                    1540	
cct tat atg tgtaaggaaa aaactaaaaa acaaaaaaaaaa aaaaaaatat	4877
Pro Tyr Met	
atatatatat atatatattt acggatgcat ttccacattc ctattatttc ttattcttat	4937
aatttttatt atttattttt ttatTTTT tttc gta gtt gat caa caa ata	4990
Val Val Asp Gln Gln Ile	
1545	
aat gta gta aat tct gat tta tat tcg gag ggt att tat gat gac	5035
Asn Val Val Asn Ser Asp Leu Tyr Ser Glu Gly Ile Tyr Asp Asp	
1550                    1555                    1560	
aca acg aca ttt taa	5050
Thr Thr Thr Phe	
1565	
<210> 12	
<211> 1568	
<212> PRT	
<213> Plasmodium falciparum	
<400> 12	
Met Lys Gly Lys Met Asn Met Cys Leu Phe Phe Phe Tyr Ser Ile Leu	
1                        5                        10                        15	
Tyr Val Val Leu Cys Thr Tyr Val Leu Gly Ile Ser Glu Glu Tyr Leu	
20                      25                      30	
Lys Glu Arg Pro Gln Gly Leu Asn Val Glu Thr Asn Asn Asn Asn	
35                      40                      45	
Asn Asn Asn Asn Asn Ser Asn Ser Asn Asp Ala Met Ser Phe Val	
50                      55                      60	

02356.0086 SEQUENCE LISTING  
Asn Glu Val Ile Arg Phe Ile Glu Asn Glu Lys Asp Asp Lys Glu Asp  
65 70 75 80  
  
Lys Lys Val Lys Ile Ile Ser Arg Pro Val Glu Asn Thr Leu His Arg  
85 90 95  
  
Tyr Pro Val Ser Ser Phe Leu Asn Ile Lys Lys Tyr Gly Arg Lys Gly  
100 105 110  
  
Glu Tyr Leu Asn Arg Asn Ser Phe Val Gln Arg Ser Tyr Ile Arg Gly  
115 120 125  
  
Cys Lys Gly Lys Arg Ser Thr His Thr Trp Ile Cys Glu Asn Lys Gly  
130 135 140  
  
Asn Asn Asn Ile Cys Ile Pro Asp Arg Arg Val Gln Leu Cys Ile Thr  
145 150 155 160  
  
Ala Leu Gln Asp Leu Lys Asn Ser Gly Ser Glu Thr Thr Asp Arg Lys  
165 170 175  
  
Leu Leu Arg Asp Lys Val Phe Asp Ser Ala Met Tyr Glu Thr Asp Leu  
180 185 190  
  
Leu Trp Asn Lys Tyr Gly Phe Arg Gly Phe Asp Asp Phe Cys Asp Asp  
195 200 205  
  
Val Lys Asn Ser Tyr Leu Asp Tyr Lys Asp Val Ile Phe Gly Thr Asp  
210 215 220  
  
Leu Asp Lys Asn Asn Ile Ser Lys Leu Val Glu Glu Ser Leu Lys Arg  
225 230 235 240  
  
Phe Phe Lys Lys Asp Ser Ser Val Leu Asn Pro Thr Ala Trp Trp Arg  
245 250 255  
  
Arg Tyr Gly Thr Arg Leu Trp Lys Thr Met Ile Gln Pro Tyr Ala His  
260 265 270  
  
Leu Gly Cys Arg Lys Pro Asp Glu Asn Glu Pro Gln Ile Asn Arg Trp  
275 280 285  
  
Ile Leu Glu Trp Gly Lys Tyr Asn Cys Arg Leu Met Lys Glu Lys Glu  
290 295 300  
  
Lys Leu Leu Thr Gly Glu Cys Ser Val Asn Arg Lys Lys Ser Asp Cys  
305 310 315 320

02356.0086 SEQUENCE LISTING

Ser Thr Gly Cys Asn Asn Glu Cys Tyr Thr Tyr Arg Ser Leu Ile Asn  
325 330 335

Arg Gln Arg Tyr Glu Val Ser Ile Leu Gly Lys Lys Tyr Ile Lys Val  
340 345 350

Val Arg Tyr Thr Ile Phe Arg Arg Lys Ile Val Gln Pro Asp Asn Ala  
355 360 365

Leu Asp Phe Leu Lys Leu Asn Cys Ser Glu Cys Lys Asp Ile Asp Phe  
370 375 380 385

Lys Pro Phe Phe Glu Phe Glu Tyr Gly Lys Tyr Glu Glu Lys Cys Met  
385 390 395 400

Cys Gln Ser Tyr Ile Asp Leu Lys Ile Gln Phe Lys Asn Asn Asp Ile  
405 410 415

Cys Ser Phe Asn Ala Gln Thr Asp Thr Val Ser Ser Asp Lys Arg Phe  
420 425 430

Cys Leu Glu Lys Lys Glu Phe Lys Pro Trp Lys Cys Asp Lys Asn Ser  
435 440 445

Phe Glu Thr Val His His Lys Gly Val Cys Val Ser Pro Arg Arg Gln  
450 455 460

Gly Phe Cys Leu Gly Asn Leu Asn Tyr Leu Leu Asn Asp Asp Ile Tyr  
465 470 475 480

Asn Val His Asn Ser Gln Leu Leu Ile Glu Ile Ile Met Ala Ser Lys  
485 490 495

Gln Glu Gly Lys Leu Leu Trp Lys Lys His Gly Thr Ile Leu Asp Asn  
500 505 510

Gln Asn Ala Cys Lys Tyr Ile Asn Asp Ser Tyr Val Asp Tyr Lys Asp  
515 520 525

Ile Val Ile Gly Asn Asp Leu Trp Asn Asp Asn Asn Ser Ile Lys Val  
530 535 540

Gln Asn Asn Leu Asn Leu Ile Phe Glu Arg Asn Phe Gly Tyr Lys Val  
545 550 555 560

Gly Arg Asn Lys Leu Phe Lys Thr Ile Lys Glu Leu Lys Asn Val Trp  
565 570 575

02356.0086 SEQUENCE LISTING

Trp Ile Leu Asn Arg Asn Lys Val Trp Glu Ser Met Arg Cys Gly Ile  
580 585 590

Asp Glu Val Asp Gln Arg Arg Lys Thr Cys Glu Arg Ile Asp Glu Leu  
595 600 605

Glu Asn Met Pro Gln Phe Phe Arg Trp Phe Ser Gln Trp Ala His Phe  
610 615 620

Phe Cys Lys Glu Lys Glu Tyr Trp Glu Leu Lys Leu Asn Asp Lys Cys  
625 630 635 640

Thr Gly Asn Asn Gly Lys Ser Leu Cys Gln Asp Lys Thr Cys Gln Asn  
645 650 655

Val Cys Thr Asn Met Asn Tyr Trp Thr Tyr Thr Arg Lys Leu Ala Tyr  
660 665 670

Glu Ile Gln Ser Val Lys Tyr Asp Lys Asp Arg Lys Leu Phe Ser Leu  
675 680 685

Ala Lys Asp Lys Asn Val Thr Thr Phe Leu Lys Glu Asn Ala Lys Asn  
690 695 700

Cys Ser Asn Ile Asp Phe Thr Lys Ile Phe Asp Gln Leu Asp Lys Leu  
705 710 715 720

Phe Lys Glu Arg Cys Ser Cys Met Asp Thr Gln Val Leu Glu Val Lys  
725 730 735

Asn Lys Glu Met Leu Ser Ile Asp Ser Asn Ser Glu Asp Ala Thr Asp  
740 745 750

Ile Ser Glu Lys Asn Gly Glu Glu Leu Tyr Val Asn His Asn Ser  
755 760 765

Val Ser Val Ala Ser Gly Asn Lys Glu Ile Glu Lys Ser Lys Asp Glu  
770 775 780

Lys Gln Pro Glu Lys Glu Ala Lys Gln Thr Asn Gly Thr Leu Thr Val  
785 790 795 800

Arg Thr Asp Lys Asp Ser Asp Arg Asn Lys Gly Lys Asp Thr Ala Thr  
805 810 815

Asp Thr Lys Asn Ser Pro Glu Asn Leu Lys Val Gln Glu His Gly Thr

820

02356.0086 SEQUENCE LISTING  
825  
830

Asn Gly Glu Thr Ile Lys Glu Glu Pro Pro Lys Leu Pro Glu Ser Ser  
835 840 845

Glu Thr Leu Gln Ser Gln Glu Gln Leu Glu Ala Glu Ala Gln Lys Gln  
850 855 860

Lys Gln Glu Glu Glu Pro Lys Lys Gln Glu Glu Glu Pro Lys Lys  
865 870 875 880

Lys Gln Glu Glu Glu Gln Lys Arg Glu Gln Glu Gln Lys Gln Glu Gln  
885 890 895

Glu Glu Glu Glu Gln Lys Gln Glu Glu Gln Gln Ile Gln Asp Gln  
900 905 910

Ser Gln Ser Gly Leu Asp Gln Ser Ser Lys Val Gly Val Ala Ser Glu  
915 920 925

Gln Asn Glu Ile Ser Ser Gly Gln Glu Gln Asn Val Lys Ser Ser Ser  
930 935 940

Pro Glu Val Val Pro Gln Glu Thr Thr Ser Glu Asn Gly Ser Ser Gln  
945 950 955 960

Asp Thr Lys Ile Ser Ser Thr Glu Pro Asn Glu Asn Ser Val Val Asp  
965 970 975

Arg Ala Thr Asp Ser Met Asn Leu Asp Pro Glu Lys Val His Asn Glu  
980 985 990

Asn Met Ser Asp Pro Asn Thr Asn Thr Glu Pro Asp Ala Ser Leu Lys  
995 1000 1005

Asp Asp Lys Lys Glu Val Asp Asp Ala Lys Lys Glu Leu Gln Ser  
1010 1015 1020

Thr Val Ser Arg Ile Glu Ser Asn Glu Gln Asp Val Gln Ser Thr  
1025 1030 1035

Pro Pro Glu Asp Thr Pro Thr Val Glu Gly Lys Val Gly Asp Lys  
1040 1045 1050

Ala Glu Met Leu Thr Ser Pro His Ala Thr Asp Asn Ser Glu Ser  
1055 1060 1065

## 02356.0086 SEQUENCE LISTING

Glu Ser Gly Leu Asn Pro Thr Asp Asp Ile Lys Thr Thr Asp Gly  
 1070 1075 1080

Val Val Lys Glu Gln Glu Ile Leu Gly Gly Gly Glu Ser Ala Thr  
 1085 1090 1095

Glu Thr Ser Lys Ser Asn Leu Glu Lys Pro Lys Asp Val Glu Pro  
 1100 1105 1110

Ser His Glu Ile Ser Glu Pro Val Leu Ser Gly Thr Thr Gly Lys  
 1115 1120 1125

Glu Glu Ser Glu Leu Leu Lys Ser Lys Ser Ile Glu Thr Lys Gly  
 1130 1135 1140

Glu Thr Asp Pro Arg Ser Asn Asp Gln Glu Asp Ala Thr Asp Asp  
 1145 1150 1155

Val Val Glu Asn Ser Arg Asp Asp Asn Asn Ser Leu Ser Asn Ser  
 1160 1165 1170

Val Asp Asn Gln Ser Asn Val Leu Asn Arg Glu Asp Pro Ile Ala  
 1175 1180 1185

Ser Glu Thr Glu Val Val Ser Glu Pro Glu Asp Ser Ser Arg Ile  
 1190 1195 1200

Met Thr Thr Glu Val Pro Ser Thr Thr Val Lys Pro Pro Asp Glu  
 1205 1210 1215

Lys Arg Ser Glu Glu Val Gly Glu Lys Glu Ala Lys Glu Ile Lys  
 1220 1225 1230

Val Glu Pro Val Val Pro Arg Ala Ile Gly Glu Pro Met Glu Asn  
 1235 1240 1245

Ser Val Ser Val Gln Ser Pro Pro Asn Val Glu Asp Val Glu Lys  
 1250 1255 1260

Glu Thr Leu Ile Ser Glu Asn Asn Gly Leu His Asn Asp Thr His  
 1265 1270 1275

Arg Gly Asn Ile Ser Glu Lys Asp Leu Ile Asp Ile His Leu Leu  
 1280 1285 1290

Arg Asn Glu Ala Gly Ser Thr Ile Leu Asp Asp Ser Arg Arg Asn  
 1295 1300 1305

## 02356.0086 SEQUENCE LISTING

Gly Glu Met Thr Glu Gly Ser Glu Ser Asp Val Gly Glu Leu Gln  
1310 1315 1320

Glu His Asn Phe Ser Thr Gln Gln Lys Asp Glu Lys Asp Phe Asp  
1325 1330 1335

Gln Ile Ala Ser Asp Arg Glu Lys Glu Glu Ile Gln Lys Leu Leu  
1340 1345 1350

Asn Ile Gly His Glu Glu Asp Glu Asp Val Leu Lys Met Asp Arg  
1355 1360 1365

Thr Glu Asp Ser Met Ser Asp Gly Val Asn Ser His Leu Tyr Tyr  
1370 1375 1380

Asn Asn Leu Ser Ser Glu Glu Lys Met Glu Gln Tyr Asn Asn Arg  
1385 1390 1395

Asp Ala Ser Lys Asp Arg Glu Glu Ile Leu Asn Arg Ser Asn Thr  
1400 1405 1410

Asn Thr Cys Ser Asn Glu His Ser Leu Lys Tyr Cys Gln Tyr Met  
1415 1420 1425

Glu Arg Asn Lys Asp Leu Leu Glu Thr Cys Ser Glu Asp Lys Arg  
1430 1435 1440

Leu His Leu Cys Cys Glu Ile Ser Asp Tyr Cys Leu Lys Phe Phe  
1445 1450 1455

Asn Pro Lys Ser Ile Glu Tyr Phe Asp Cys Thr Gln Lys Glu Phe  
1460 1465 1470

Asp Asp Pro Thr Tyr Asn Cys Phe Arg Lys Gln Arg Phe Thr Ser  
1475 1480 1485

Met His Tyr Ile Ala Gly Gly Ile Ile Ala Leu Leu Leu Phe  
1490 1495 1500

Ile Leu Gly Ser Ala Ser Tyr Arg Lys Asn Leu Asp Asp Glu Lys  
1505 1510 1515

Gly Phe Tyr Asp Ser Asn Leu Asn Asp Ser Ala Phe Glu Tyr Asn  
1520 1525 1530

Asn Asn Lys Tyr Asn Lys Leu Pro Tyr Met Val Val Asp Gln Gln  
1535 1540 1545

02356.0086 SEQUENCE LISTING

Ile Asn Val Val Asn Ser Asp Leu Tyr Ser Glu Gly Ile Tyr Asp  
1550 1555 1560

Asp Thr Thr Thr Phe  
1565

<210> 13

<211> 24

<212> DNA

<213> artificial sequence

<220>

<223> sequence is completely synthesized

<400> 13  
cctggagccc gtcagtatcg gcgg

24

<210> 14

<211> 23

<212> DNA

<213> artificial sequence

<220>

<223> sequence is completely synthesized

<400> 14  
ggtagcgacc ggcgctcagc tgg

23

<210> 15

<211> 25

<212> DNA

<213> artificial sequence

<220>

<223> sequence is completely synthesized

<400> 15  
aaaagtgtatg atagaaatgc ttgtg

25

02356.0086 SEQUENCE LISTING

<210> 16

<211> 25

<212> DNA

<213> artificial sequence

<220>

<223> sequence is completely synthesized

<400> 16

ttttgttcat ttacttatt tcacc

25

<210> 17

<211> 22

<212> DNA

<213> artificial sequence

<220>

<223> sequence is completely synthesized

<400> 17

cggaaatcagg tttaaatcca ac

22

<210> 18

<211> 21

<212> DNA

<213> artificial sequence

<220>

<223> sequence is completely synthesized

<400> 18

agatcgaaaa tcatcagggg g

21